

US LHC Accelerator Research Program - Task Sheet

Task Name: HQ Conceptual Design and Analysis (WBS 2.1.4.1)

Date: 10/18/05

Task leader: G. Sabbi (LBNL)

Participating laboratories: BNL, FNAL, LBNL

Time period: FY06-FY07

Budget request:

	FY06 (Labor)		FY07 (Labor)	
	LARP	Core	LARP	Core
BNL	0	0	9	0
FNAL	39	7	48	0
LBNL	62	19	61	0
Total	101	26	118	0

Statement of work:

The LARP Model Magnet plan includes the development of shell-type, high gradient quadrupoles (HQ) with 90 mm aperture and 250 T/m nominal gradient (with >15% margin). The goal of this task is to perform conceptual design studies of such magnets in order to determine their optimal target parameters and features to be implemented during the model magnet R&D phase. The studies will include magnetic, mechanical and quench protection analysis; feedback from the TQ, SQ and LR magnets; results from Nb3Sn strand and cable R&D. Based on these results, the HQ design and R&D plan will be developed. The FY06 design study will concentrate on coil design issues, to allow starting a detailed engineering design of the coil and tooling in FY07. The FY07 design study effort will concentrate on mechanical support issues and further design optimization.

Work plan and milestones:

FY06-Q1/Q2	<ul style="list-style-type: none">• HQ design objectives and target parameters; sub-task guidelines• Definition of preliminary conductor and cable parameters• Study and discussion of magnetic and mechanical design options• Magnetic analysis and design of coil ends
FY06-Q3/Q4	<ul style="list-style-type: none">• Comparison of magnetic design options• Selection of HQ coil design(s)• Mechanical analysis and design of magnet ends
FY07-Q1/Q2	<ul style="list-style-type: none">• Feedback from model magnet and supporting R&D (TQ, SQ, LR)• Evaluation of mechanical structures (both analysis and test results)• Selection of HQ mechanical design(s)• Analysis of fabrication cost and schedule
FY07-Q3/Q4	<ul style="list-style-type: none">• Feedback from conductor and cable R&D• Design optimization and final parameters• R&D plan development• Documentation and reporting